

REMARKS

The Office Action mailed April 5, 2005 has been received and reviewed. Claims 1 – 17 remain pending in the application. Claims 1 and 10 have been amended by the amendment being filed herewith.

Claims 5-7, 12 and 14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form to include all of the limitations of the base claim and any intervening claims. The Applicant wishes to thank the Examiner for recognizing the allowable subject matter of these claims. For the reasons set forth below, these claims are believed to be allowable in their original form.

Claims 1, 2, 4, 10, 11 and 13 stand rejected under 35 U.S.C. 102(b) as being unpatentable over U.S. Patent No. 5,216,325 to Patel et al. The Applicant respectfully traverses the rejection. However, this rejection is believed to be moot in view of the amendment to independent claims 1 and 10. Claims 1 and 10 have been amended to recite “a dielectric layer covering at least portions of each of the cathode element, the anode element, the trigger electrode, and the spark gap, wherein when the trigger electrode is actuated, an electrical current passes through the trigger electrode causing at least partial vaporization of the trigger electrode, said at least partial vaporization of the trigger electrode causing a plasma gas to be released that moves a portion of said dielectric layer away from the spark gap to allow ions to flow across the spark gap between the cathode element and the anode element....”. Neither Patel, et al. nor any of the other prior art of record teach or suggest a spark gap device having these features.

In Patel, et al., a dielectric layer 15 is deposited over the trigger electrode 12, but not over the anode element 16, the cathode element 17 and the spark gap 19. The purpose of the dielectric layer 15 is to electrically isolate the anode and cathode elements 16 and 17 from the trigger electrode 12. The dielectric layer 15 in Patel, et al. does not extend over the spark gap 19. To the contrary, the spark gap 19 extends above the dielectric layer 15. (See Col. 3, lines 23 – 26). Therefore, it is clear that the operation of the device of Patel,

et al. is not the same as described in the above-quoted claim language of the present application. In Patel, et al., when a trigger pulse is applied to the trigger electrode 12, gas atoms in the spark gap 19 are ionized, which lowers the breakdown voltage across the spark gap 19 below the potential voltage between the anode and cathode elements 16 and 17 and causes electrical discharge across the spark gap 19. (See Col. 3, lines 55 – 63). In contrast, in accordance with the invention recited in independent claims 1 and 10, when the trigger electrode is actuated, at least a portion of the trigger electrode vaporizes, which causes a plasma gas to be released that moves the dielectric layer covering at least portions of the cathode element, the anode element, the trigger electrode and the spark gap away from the spark gap. Movement of the dielectric layer away from the spark gap allows electrical discharge between the anode and cathode elements. (See page 5 of the present application, paragraph 21).

One of the advantages of the invention of covering at least portions of the anode element, the cathode element, the trigger electrode and the spark gap with a dielectric layer is that the dielectric layer provides passivation that ensures that electrical discharge will not occur until the trigger electrode is actuated, which is extremely important in many cases, such as when the spark gap device is being used to detonate explosives. Patel, et al. does not provide any such passivation, which means that extreme care must be taken with the device of Patel, et al. to ensure that no contaminants will accumulate in the spark gap region that might cause unintended electrical discharge to occur. Although Patel, et al. does refer to using additional dielectric layers 27 and 28, neither of these layers covers the spark gap edges 20 and 21 and the terminal ends 22 and 23 of the anode and cathode elements 16 and 17, respectively. (See Col. 3, lines 35 – 46). Patel, et al. also refers to a cover 26 that may be fused to the layers 27 and 28 to form an enclosed chamber 29 surrounding the spark gap 19, which may be filled with dry air or an inert gas for maintaining controlled conditions at the spark gap 19. (See Col. 3, lines 46 – 54). This is not the same as the dielectric layer recited in independent claims 1 and 10 of the present

application, nor does it perform the same functions as the dielectric layer recited in independent claims 1 and 10.

For at least these reasons, the Applicant respectfully requests that the rejection of claims 1, 2, 4, 10 – 11 and 13 under 35 U.S.C. 102(b) as being unpatentable over Patel, et al. be withdrawn.

Claim 17 stands rejected under 35 U.S.C. 102(b) as being unpatentable over U.S. Patent No. 5,309,841 to Hartman, et al. The Applicant respectfully traverses the rejection. Hartman discloses a semiconductor bridge igniter, not a spark gap device. Although the text of Hartman, et al. does refer to a gap, the gap is not a spark gap, but is simply a gap between lands 12 and 14 into which an explosive charge 22 is placed. The explosive charge 22 is ignited by a plasma gas that is formed between the lands 12 and 14 when a given voltage potential is applied across the lands 12 and 14 by charging a capacitor to a voltage in excess of the rated discharge voltage between the lands 12 and 14. This is different from generating a spark across the spark gap by causing an electrical discharge to occur between an anode element and a cathode element of the spark gap device, as recited in the independent claims of the present application.

In addition, claim 17 of the present application recites “integrally forming an explosive device ... comprising an anode element, a cathode element, and a conductive bridge element that connects the anode and cathode elements of the explosive device together”. The explosive charge described in Hartman, et al. does not have this configuration. Figs. 1 and 6 of Hartman, et al. both show an explosive material 22 and 122, respectively, having an irregular shape and no particular configuration. For at least this reason, the Applicant respectfully submits that claim 17 is patentable over Hartman, et al. under 35 U.S.C. §102(b) and requests that this rejection be withdrawn.

Claims 3 and 12 stand rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,216,325 to Patel et al. The Applicant respectfully traverses the rejection. Claims 3 and 12 depend from independent claims 1 and 10, respectively, which are

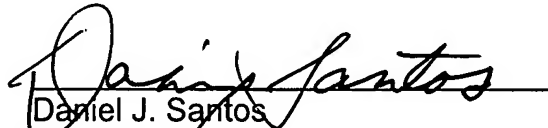
believed to be allowable for the reasons stated above. Therefore, this rejection is also believed to be moot in view of the amendments to claims 1 and 10.

Claims 6, 7 and 15 stand rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,216,325 to Patel et al. in view of U.S. Patent No. 5,309,841 to Hartman et al. The Applicant respectfully traverses the rejection. Nevertheless, because claims 6, 7 and 15 depend from either independent claim 1 or 10, respectively, which are believed to be allowable for the reasons stated above, this rejection is also believed to be moot in view of the amendments to claims 1 and 10.

CONCLUSION

In view of the amendments submitted herein and the above comments, it is believed that all grounds of rejection are overcome and that the application has now been placed in full condition for allowance. Accordingly, Applicant earnestly solicits early and favorable action. Should there be any further questions or reservations, the Examiner is urged to telephone Applicant's undersigned attorney at (770) 984-2300.

Respectfully submitted,


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